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Remarks

Claims 1-43 and 46-53 are presently at issue in this pending patent application. Independent Claim 1 has been amended to clarify features already included in the claim. Independent Claim 40 has been amended to include the features of dependent Claims 44 and 45, and Claims 44 and 45 have been cancelled. Dependent Claims 13, 15, 17, 20, 29, 35, 43 and 53 were amended to correct scrivener's errors. No new matter has been added. Reconsideration of the pending Claims and allowance is respectfully requested in view of the following comments.

The 35 U.S.C. 103(a) Claim Rejections

Claims 1-53 stand rejected pursuant to 35 U.S.C. §103(a) as being obvious in view of U.S. Patent No. 6,535,785 to Johnson et al. (hereinafter "Johnson") in view of U.S. Patent No. 6,589,437 to Collins. (hereinafter "Collins"). Applicant respectfully traverses these rejections since the cited references, either alone or in combination, fail to teach each and every limitation included in the Claims and therefore a *prima facie* case of obviousness has not been established.

A. Claims 1-9

Claim 1 provides an RF generating system for supplying RF output power. The RF generating system includes an RF power node and a main power source electrically coupled with the RF power node. The main power source is operable to supply power to the RF power node that is utilized in generation of RF output power. In addition, the system includes an auxiliary power source electrically coupled with the RF power node. The auxiliary power source is operable to supplement the power supplied by the main power source.

In contrast, Johnson teaches three RF power sources (2A, 2B and 2C) that are respectively connected to a coil (30), a bias shield (32) and a chuck (31). (Fig. 1) Accordingly, as indicated in the office action, Johnson does not teach a main power source and an auxiliary power source electrically coupled with an RF power node as recited in Claim 1.

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Collins teaches a power source (670) connected with an antenna (660) and a bias source (680) connected to a workpiece support (630). (Fig. 11 and Col. 16 lines 25-31) As known in the art, a workpiece is placed on the workpiece support and a process gas is ignited and sustained as plasma with energy provided by the power source. (Col. 3 lines 49-59) As further known in the art, when the plasma is ignited, a portion of the gas may be ionized to have an electric charge that allows control of etching with an electric field produced by the bias source. (Col. 3 lines 59-75) (See also for example, US Patent No. 5,688, 357)

A signal modulator (99) connected to the power source and the bias source is also taught by Collins. (Fig. 11 and Col. 16 lines 31-37) The signal modulator provides a modulation signal that controls the energy supplied by the power source to the antenna to ignite and sustain the plasma. (Col. 16 lines 31-34) In addition, the signal modulator provides the modulation signal to the bias source to control the electric field produced by the bias source to maneuver portions of the plasma during the etching of the workpiece. (Col. 17 lines 31-39) Accordingly, the signal modulator may control the magnitude of power supplied by both the power source and the bias source.

Clearly, Collins does not teach, suggest or disclose a main power source AND an auxiliary power source both electrically coupled with an RF power node as provided in Claim 1. In fact, the relevant features of interest in the systems taught by both Collins and Johnson are described in the background section of Applicant's specification. In the office action, it appears that the signal modulator taught by Collins has been construed as being an RF power node since this appears to be the only single device in Collins that is coupled to both the source power supply and the bias power supply. Applicant respectfully traverses this apparent assertion, since the signal modulator provides control signals and does not have any functionality related to the supply of RF power other than controlling an RF power source. Clearly, one skilled in the art would understand that a signal modulator is not an RF power node.

Even if one could somehow construe that the signal modulator of Collins was an RF power node, which is clearly not the case, it is clear that power from the main power source in Collins is NOT supplied to an RF power node, NOR that the power

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supplied is supplemented by an auxiliary source. Applicant has amended Claim 1 to more clearly describe that the main power supply is operable to supply power to the RF power node and that the auxiliary power source is coupled to the RF power node and is operable to supplement the power supplied by the main power source.

Applicant also respectfully traverses the rejection of dependent claims 2-9. Applicants have carefully reviewed the portions of Johnson and could find no teaching or suggestion of the features recited in Claims 2-6 and 8. Specifically, neither Collins nor Johnson teach, suggest or disclose an RF output stage that generates RF output power on the RF power node as a function of the power supplied by a main AND an auxiliary power source as provided in Claim 2. In addition, neither Collins nor Johnson teach, suggest or disclose that the main power supply comprises a switch mode DC power supply and that the auxiliary power supply comprises a linear DC power supply as provided in Claims 3 and 4. Further, neither Collins nor Johnson teach a combiner operable to generate RF output power on the RF power node as a function of the power supplied by a main AND an auxiliary power source as provided in Claim 5. Also, Collins and Johnson alone or in combination fail to teach, suggest or disclose a main power source that is a switch mode power supply and an auxiliary power source that is an amplitude agile power amplifier as described in Claim 6. With regard to Claim 8, neither Johnson nor Collins teach, suggest or disclose that a main power source supplies power as a function of an operating point, AND that an auxiliary power source supplies power as a function of a feedback signal.

Accordingly, all of the features described by Claims 1-6 and 8 are not taught or suggested by the combination of the cited prior art. Thus, a *prima facie* case of obviousness has not been established with regard to Claims 1-6 and 8. In addition, Claims 7 and 9 depend from Claims 5 and 1 respectfully and therefore a *prima facie* case of obviousness has not been established for claims 7 and 9.

B. Claims 10-22

Claim 10 provides an RF generating system for supplying RF output power. The RF generating system includes an RF output stage and a first power supply

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electrically coupled with the RF output stage. The first power supply is operable to supply DC power to the RF output stage. In addition, the system includes a second power supply electrically coupled with the first power supply and the RF output stage. The DC power is selectively adjustable by the second power supply.

In contrast, neither Collins nor Johnson teach, suggest or disclose a second power supply electrically coupled with a first power supply AND an RF output stage as disclosed by Claim 10. Even if it was somehow construed that this was the case, which it clearly is not, Collins and Johnson neither alone nor in combination teach, suggest or disclose a first power supply operable to supply DC power to an RF output stage and a second power supply capable of selectively adjusting the DC power as further described in Claim 10.

Applicant was also unable to find in the cited portions of Johnson support for the assertions in the office action regarding Claims 11-13, 16-17 and 21-22. Specifically, Collins and Johnson fail to teach, suggest or disclose a frequency response capability of a first power supply with respect to a frequency response of a second power supply as described in Claim 11. In fact, none of the cited references discuss power supply frequency response relationships among power supplies at all. Accordingly, the modulation frequency of the first power supply as provided in Claim 12 and the adjustment of the DC power in a range of frequencies up to the frequency of the RF power as described in Claim 13 is also not taught, suggested or disclosed. Further, modulation of the DC power by a first power supply as a function of an RF setpoint AND adjustment of the DC power with a second power supply as a function of a feedback signal indicative of stability as described in Claims 16 and 17 is not taught or disclosed by the cited prior art. A first power supply electrically connected in series with a second power supply as provided in Claim 21 and a first power supply electrically connected in parallel with a second power supply as described in Claim 22 is also not taught, suggested nor disclosed.

Thus, all of the features described by Claims 10-13, 16-17 and 21-22 are not taught or suggested by the cited combination of the prior art. As such, a *prima facie* case of obviousness has not been established with regard to these claims. In addition, Claims 14-15 and 18-20 depend from independent Claim 10, and therefore

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a *prima facie* case of obviousness has not been established with respect to these Claims either.

C. Claims 23-32

Claim 23 provides an RF generating system for processing plasma. The RF generating system includes an RF output stage operable to generate RF output power and a DC rail electrically coupled with the RF output stage. The system also includes a switch-mode DC power supply electrically coupled with the DC rail. The switch-mode DC power supply is operable as a main power supply to modulate the magnitude of DC power on the DC rail as a function of an RF setpoint. In addition, the system includes a linear DC power supply electrically coupled with the DC rail. The linear DC power supply is operable as an auxiliary power supply to buck and boost the DC power on the DC rail as a function of a feedback signal.

In contrast, neither Collins nor Johnson teach, suggest or disclose a switch mode DC power supply AND a linear DC power supply electrically coupled with a DC rail. Even if one was to somehow construe that a switch mode and a linear DC power supply coupled with a DC rail was taught, which is clearly not the case, modulation of the DC rail with the switch mode DC power supply AND buck and boost of the DC power on the DC rail with a linear DC power supply is not taught, suggested nor disclosed by the cited references. Further, modulation of the DC rail by the switch mode power supply as a function of a setpoint AND buck and boost of the DC power on the DC rail by the linear DC power supply as a function of a feedback signal is not taught, suggested or disclosed.

A review by the Applicant of those portions of Johnson cited in the office action again leads to Applicant's belief that the features recited in Claims 26-32 are not taught, suggested or disclosed by the cited prior art. Specifically, neither Johnson nor Collins teach a feedback signal operable with a linear DC power supply as described in Claims 26-27, modulation of output power by the switch-mode DC power supply AND the linear DC power supply as described in Claims 28-30, or a controller operable to perform coarse control AND fine control with the switch-mode

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DC power supply AND the linear DC power supply, respectively, as provided in Claims 31-32.

Accordingly, all of the features provided by Claims 23 and 26-32 are not taught or suggested by the cited combination of the prior art. A *prima facie* case of obviousness has therefore not been established with regard to Claims 23 and 26-32. In addition, Claims 24-25 depend from independent Claim 23 and therefore a *prima facie* case of obviousness has not been established for Claims 24-25 either.

D. Claims 33-39

Claim 33 provides an RF generating system for generating RF output power to process plasma. The RF generating system includes a first RF output stage, a second RF output stage and a combiner. The second RF output stage is in operable cooperation with the first RF output stage, and the combiner is electrically coupled with the first RF output stage and the second RF output stage. The combiner is operable to combine RF power supplied by the first RF output stage and the second RF output stage to generate RF output power.

The office action has asserted that Johnson discloses "a combiner electrically coupled with the first RF output stage and the second RF output stage" and that "the combiner is operable to combine the RF power supplied by the first RF output stage." However, the office action also indicates that Johnson does not teach a second RF output stage to generate RF output power. If Johnson does not teach the second RF output stage, it is not possible for Johnson to teach a combiner electrically coupled with the first RF output stage and the second RF output stage as provided in Claim 1.

In addition, Claim 33 provides that the combiner is operable to combine RF power supplied by the first RF output stage AND the second RF output stage to generate RF output power. Clearly, Johnson cannot teach, suggest or disclose such a combiner if Johnson does not teach a second RF output stage. This is further evidenced in the office action, where it was asserted that Johnson teaches that "the combiner operable to combine RF power supplied by the first RF output stage", without indication of what the RF power supplied by the first RF output stage is

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combined with. Since Johnson fails to teach the second RF output stage, Johnson cannot teach the limitation of a combiner that is operable to combine RF power supplied by the first RF output stage and the second RF output stage to generate RF output power as provided in Claim 33.

Applicant also respectfully traverses the assertion that the combination of Collins and Johnson teach the limitations in claims 34-36 since neither of the cited references teach both a first RF output stage and a second RF output stage comprising amplifiers as described in Claims 34-35 or control of the second output stage as provided in Claim 36. In addition, neither Johnson nor Collins teach or suggest that a second RF output stage is operable to adjust the RF power provided by the first RF output stage as provided in Claim 37, or that the RF power supplied by the second RF output stage is added and subtracted from the RF power supplied by the first RF output stage as described in Claim 38. As previously discussed, not even the combination of the RF power is taught by any of the cited prior art. It follows that the frequency response capability of the second RF output stage with respect to the first RF output stage as described in Claim 39 is not taught, suggested or disclosed by any of the cited prior art references.

All of the features described by Claims 33-39 are not taught or suggested by the cited prior art either alone or in combination, and therefore a *prima facie* case of obviousness has not been established.

E. Claims 40-49

Amended Claim 40 describes a method of supplying RF output power. The method includes generating RF output power and coarsely controlling the RF output power to an operating point represented as an RF setpoint as a function of power supplied by a main power source. In addition, the method includes modulating the RF output power in a metastable region surrounding the operating point to finely control the RF output power as a function of power supplied by an auxiliary power source.

The office action has asserted that the combination of Collins and Johnson disclose all the steps of the method, however, as previously discussed, neither

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Johnson nor Collins teach generating RF output power with power supplied by a main power source AND an auxiliary power source. It follows that coarsely controlling RF output power to an operating point represented as an RF setpoint as a function of power supplied by a main power source and modulating the RF output power in a metastable region surrounding the operating point to finely control the RF output power as a function of power supplied by an auxiliary power source as described in Claim 40 cannot be taught, suggested or disclosed by the cited prior art. Collins teaches only two separate sources of power, namely a power source and a bias source that are supplying two separate loads, namely an antenna and a workpiece support.

Accordingly, Collins teaches away from coarsely controlling RF output power as a function of power supplied by a main power source while modulating the RF output power in a metastable region surrounding the operating point as described in Claim 40. Clearly, the two separately operated power sources of Collins cannot teach supplying power with the auxiliary power supply that is DC power to buck and boost the DC power supplied by the first power supply as disclosed in Claim 47.

In addition, modulating the amplitude of the RF output power with the main power source at frequencies at least one order of magnitude less than the frequency of the RF output power as described in Claim 42, and modulating the RF output power with the auxiliary power source at frequencies up to the frequency of the RF output power as described in Claim 43 is not taught, suggest or disclosed. Further, supplying power to a combiner as described in Claim 48, and rotating the phase of the RF power supplied by the second power supply as described in Claim 49 is not taught, suggested or disclosed by any of the cited references.

All of the features provided by Claims 40-43 and 46-49 are not taught or suggested by the cited prior art either alone or in combination, and therefore a *prima facie* case of obviousness has not been established.

F. Claims 50-53

Claim 50 describes a method of supplying RF output power to process plasma. The method includes generating RF output power with an RF output stage

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and controlling the amplitude of the RF output power with DC power supplied to the RF output stage by a first power supply in combination with a second power supply.

Applicant respectfully traverses these rejections since, as previously discussed, none of the cited prior art teaches, suggests or discloses controlling the amplitude of the RF output power with DC power supplied to the RF output stage by a first power supply in combination with a second power supply as described in Claim 50. The office action has apparently asserted that Collins teaches DC power is supplied to an RF output stage by a first power supply in combination with a second power supply. As previously discussed, Collins teaches separate RF power sources supplying RF power to two separate loads (antenna and workpiece support). Johnson similarly teaches separate RF power sources supplying RF power to separate loads (coil, chamber and chuck). Accordingly, the amplitude of the RF output power in both Johnson and Collins is generated independently by each of the RF power sources. Neither Collins nor Johnson teach, suggest or disclose that the RF power sources are provided DC power by more than one power supply to control the amplitude of the RF power. Thus, none of the cited prior art alone or in combination teach, suggest or disclose controlling the amplitude of the RF output power with DC power supplied to an RF output stage by a first power supply in combination with a second power supply as described in Claim 50.

Since DC power supplied by a first and second power supply is not taught, suggested or disclosed, the cited prior art cannot possibly teach the modulation frequencies as described in Claim 51. In addition, controlling the magnitude of DC power supplied by the first and second power supplies as described in Claims 52 and 53 is also not taught suggested or disclosed.

All of the features provided by Claims 50-53 are not taught or suggested by the cited prior art either alone or in combination, and therefore a *prima facie* case of obviousness has not been established.

Conclusion

Applicant has identified a significant number of limitations provided in Claims 1-43 and 46-53 that are not taught, suggested or disclosed by any of the cited

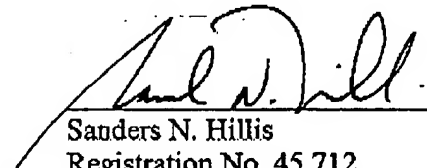
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prior art either alone or in combination. Accordingly, the office action has failed to establish a *prima facie* case of obviousness. Applicant therefore respectfully requests the Examiner to withdraw the 35 U.S.C. 103(a) rejection of Claims 1-43 and 46-53.

The application is believed to now be in condition for allowance, which is respectfully requested. Should the Examiner deem a telephone conference to be beneficial in expediting allowance of this application, the Examiner is invited to call the undersigned attorney at the telephone number listed below.

Respectfully submitted,



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